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June 9, 1993

To: Minerals File

From: Holland Shepherd, Senior Reclamation Specialist *HS*

Subject: Meeting with Kennecott, Barney's Canyon Staff, and Div. of Water Quality  
Concerning the Permitting of Waste Rock Material, Kennecott Corp.,  
M/035/009, Salt Lake County, Utah

Meeting Date: June 9, 1993

Meeting Time: 2:30 - 4:30 p.m.

Participants: Dave Hodson, Mike Pagel, Barneys Canyon, Kennecott; Larry Mize,  
Mac Croft, John Kennington, DWQ; Holland Shepherd, DOGM

## Introduction

I met today with representatives of DWQ and staff of the Barneys Canyon Mine, to discuss concerns surrounding the safe disposal of sulfide and sulfate waste rock materials. The waste rock will be generated from the mining of four different rock bodies associated with the Barneys, Melco, South Barneys Canyon South and North Barneys Canyon South sites. DWQ has asked that the operator incorporate the existing and proposed dumps into the ground water permit for the site. Concern has been expressed by DWQ about the potential for sulfate generation stemming from the waste dumps.

## Current Material Evaluation

The total sulfide content of waste rock materials is < 5% for the rock materials found at the mine site. The Melco area contains the highest amount of sulfides. The highest readings have been about 4%. The highest sulfide contents are found in materials from the Kirkman-Diamond Creek formation and the Freeman Peak formation. The former is composed chiefly of sandstone and the latter is composed chiefly of quartzite. The Melco, SBCS and NBCS pits are found in these formations. Little or no sulfides are found in materials associated with the Park City Formation, a



dolomite based material. The Barneys Canyon pit is located in this formation (see attachment).

Based on requests from DWQ, the operator has been performing further investigations into the nature of the waste rock materials (existing and yet to be generated). The operator has commissioned the help of Steffen, Robertson and Kirsten in addressing the question of characterizing the wastes. A letter summarizing their investigation was forwarded to the Division from DWQ and dated January 15, 1993 (see file).

The study evaluated rock wastes at the four sites, breaking them into categories of oxidized vs sulfide wastes. The wastes were then evaluated for total sulfur, sulphate, and sulfide, and then acid and neutralizing potential.

According to Dave Hodson, the results of the study indicated that there is no potential for acid production at the Barneys Canyon pit, negligible at the NBCS, existing sulfate potential at the SBCS, and an existing potential for acid and sulfate production at the Melco pit, particularly with the existing sulfide ore stockpiles at this site.

### **Areas of Most Concern**

The two sites where potential problems are the most probable are at the Melco site and the SBCS site. The SBCS site has an ore body close to the surface; therefore, the sulfides have already been oxidized, producing sulfates which remain in the material. These sulfates can be readily mobilized if encountered by leachates.

The operator had originally proposed to use the waste rock from the SBCS site to dump into a narrow valley next to the pit. The dump would have created a dam, which would impound water during wet times of the year. The operator, having found out the material's sulfate content is now proposing to deposit the material in a fashion which does not interfere with the stream channel and reduce the amount of water which it might come in contact with.

### **Ideas for Mitigation**

At the Melco pit, the operator offered to either encapsulate the sulfide waste material in a depository, or incorporate it into the waste dumps with enough calcareous wastes to buffer any acid formation. After discussion of the encapsulation scenario, we felt that this option may prove to be the less desirable, because the

concentration of sulfides may cause more problems, in the long term, than the incorporation of sulfides into a large body of neutralizing material. This option, however is still to be evaluated by the operator.

Mac Croft brought up the question concerning sulfide rock exposure in the Melco Pit. The sulfide rock would be left exposed to the elements after mine closure. Mr. Hodson indicated that while there would no doubt be some oxidation of this material, the rate would be slowed by the fact that the rock was still intact (consolidated). Also, the operator would deposit enough calcareous material at the bottom of the pit to buffer any acid drainage that might be formed coming off the pit walls. Another option Mr. Hodson offered was to spray the material with a phosphate based compound which would significantly reduce oxidation for 50 years.

Our discussion involved the possibility of a management plan (a management plan would be required by DWQ as part of the operator's ground water permit) for the waste dumps, which would involve reclamation and prevention of groundwater and surface water contamination. Mr. Hodson suggested that the plan might include specifications for waste dump: slope angle, revegetation, drainage design and capping (topsoil and subsoil reapplication). The intent of the plan would be to limit, as much as possible, the amount of leachate getting into the dumps. Reduction of leachate production can be achieved by using much of the same procedures used in traditional reclamation of a site (regrading, topsoiling, and revegetating). Surface water control would be the most critical element in controlling leachate production.

DWQ indicated that the management plan would have to address prevention of natural, background groundwater contamination. The groundwater associated with the Barneys Canyon portion of the site is still quite pristine, however the groundwater associated with the Dry Fork Canyon portion of the site is quite degraded, by the operation of the Bingham Pit. The operator indicated that it would be pointless to place a lot of effort into preventing sulfate degradation of the Dry Fork area. Also, Mr. Hodson pointed out that the Bingham Canyon Mine would one day be filling up the Dry Fork drainage with mine wastes. We discussed the fact that it would still be necessary to prevent as much as possible, the generation of sulfate leachates in this area. However, the critical area would be the Barneys Canyon portion of the site.

## **Conclusions**

We discussed the development of a leachate production model for the various dumps, using the HELP model, or something comparable. This would give us

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a better idea of the potential of leachate generation given different capping and slope scenarios. We also discussed the development of a column leach test, to address the question of sulfate generation from sulfide containing, but non-acid producing, wastes. The column leach test would be used to evaluate the different waste materials.

I and DWQ staff agreed that the above would give us a much better idea from which to base further discussion or decisions. Mr. Hodson did not commit to anything specifically, but indicated that he would get back to us with a decision after discussing it with his consultants and staff.

jb  
Attachment  
kendwq.mem